

What is claimed is:

1. A carbon nanotube manufacturing apparatus, comprising:  
a reaction tube in which a carbon nanotube is grown by vapor phase growth;

a gas supplying pipe that supplies a carbon-containing raw material carried on a gas flow to an interior of the reaction tube;

a heating unit that heats the interior of the reaction tube;

a gas decomposer that is placed in the reaction tube to decompose the carbon-containing raw material upon contact with the gas flow;  
and

a synthesizing portion that is placed in the reaction tube and continuously supplied with the decomposed carbon-containing raw material, which has been carried on the gas flow to an outside of the gas decomposer, to synthesize a carbon nanotube.

2. A carbon nanotube manufacturing apparatus according to claim 1, wherein the gas decomposer comprises a porous material.

3. A carbon nanotube manufacturing apparatus according to claim 1, wherein the gas decomposer comprises a porous material formed from a metal oxide material and from a carbon material.

4. A carbon nanotube manufacturing apparatus according to claim 1, wherein the synthesizing portion comprises one or two or more

substrates.

5. A carbon nanotube manufacturing apparatus according to claim 1, wherein the synthesizing portion comprises two or more substrates arranged approximately parallel to one another.

6. A carbon nanotube manufacturing apparatus according to claim 4, wherein the gas decomposer is placed on a surface of the substrate that serves as the synthesizing portion.

7. A carbon nanotube manufacturing apparatus according to claim 1, wherein:

the gas supplying pipe is extended to the interior of the reaction tube so that a releasing port of the gas flow is positioned inside the reaction tube; and

the gas decomposer is placed in the gas supplying pipe in a manner that allows the gas decomposer to have contact with the flow of gas supplied.

8. A carbon nanotube manufacturing apparatus according to claim 7, further comprising an auxiliary heating unit that serves to heat the gas decomposer in the vicinity of the gas decomposer in the gas supplying pipe.

9. A carbon nanotube manufacturing apparatus according to claim 7, wherein the gas decomposer comprises an aggregation of a granular porous material.

10. A carbon nanotube manufacturing apparatus according to claim 7, wherein the gas decomposer comprises an aggregation of a granular porous material formed from a metal oxide material and from a carbon material.

11. A carbon nanotube manufacturing apparatus according to claim 7, wherein the synthesizing portion is placed in the vicinity of the gas flow releasing port of the gas supplying pipe.

12. A carbon nanotube manufacturing apparatus according to claim 11, wherein the synthesizing portion comprises one or two or more substrates.

13. A carbon nanotube manufacturing apparatus according to claim 11, wherein at least one of the substrates serving as the synthesizing portion is placed perpendicular to or at an angle to the direction of the flow of the gas released from the releasing port of the gas supplying pipe.

14. A carbon nanotube manufacturing apparatus according to

claim 1, wherein the gas decomposer is placed on the entirety of or a part of an inner wall of the reaction tube and the synthesizing portion is placed on a surface of the gas decomposer.

15. A carbon nanotube manufacturing apparatus according to claim 1, wherein a metal catalyst is put in the synthesizing portion.

16. A carbon nanotube manufacturing apparatus according to claim 15, wherein the metal catalyst having a thin film form is put in the synthesizing portion.

17. A carbon nanotube manufacturing apparatus according to claim 1, wherein the synthesizing portion comprises a substrate that is formed from a material containing a metal catalyst.

18. A carbon nanotube manufacturing apparatus according to claim 1, wherein:

the heating unit comprises a heating furnace; and  
the reaction tube is placed inside the heating furnace.

19. A carbon nanotube manufacturing method, comprising:  
decomposing a carbon-containing raw material carried on a gas flow by bringing the gas flow into contact with a heated gas decomposer; and

synthesizing a carbon nanotube on a synthesizing portion by continuously supplying the decomposed carbon-containing raw material carried on the gas flow to an outside of the gas decomposer to the synthesizing portion.

20. A carbon nanotube manufacturing method according to claim 19, wherein the gas decomposer comprises a porous material.

21. A carbon nanotube manufacturing method according to claim 19, wherein the gas decomposer comprises a porous material formed from a metal oxide material and from a carbon material.

22. A carbon nanotube manufacturing method according to claim 19, wherein the synthesizing portion comprises one or two or more substrates.

23. A carbon nanotube manufacturing apparatus according to claim 19, wherein the synthesizing portion comprises two or more substrates arranged approximately parallel to one another.

24. A carbon nanotube manufacturing method according to claim 22, wherein the gas decomposer is placed on a surface of a substrate that serves as the synthesizing portion so as to bring the gas flow into contact with the gas decomposer.

25. A carbon nanotube manufacturing method according to claim 19, wherein:

the gas decomposer is placed in a gas supplying pipe;

the gas flow is introduced from an inlet of the gas supplying pipe; and

the synthesizing portion is placed along the gas flow path that has passed through the gas decomposer.

26. A carbon nanotube manufacturing method according to claim 25, wherein the gas decomposer comprises a granular porous material.

27. A carbon nanotube manufacturing method according to claim 25, wherein the gas decomposer comprises a granular porous material formed from a metal oxide material and from a carbon material.

28. A carbon nanotube manufacturing method according to claim 25, wherein the synthesizing portion is placed in the vicinity of the gas flow releasing port of the gas supplying pipe.

29. A carbon nanotube manufacturing method according to claim 28, wherein the synthesizing portion comprises one or two or more substrates.

30. A carbon nanotube manufacturing method according to claim 28, wherein at least one of the substrates serving as the synthesizing portion is placed perpendicular to or at an angle to the direction of the flow of the gas released from the releasing port in the gas supplying pipe.

31. A carbon nanotube manufacturing method according to claim 19, wherein:

the gas decomposer is placed approximately parallel to the direction of the flow of the gas so as to surround the entirety of or a part of the circumference of the flowing gas; and

the synthesizing portion is placed on a surface of the gas decomposer.

32. A carbon nanotube manufacturing method according to claim 19, wherein:

the gas flow is heated by a heating furnace; and

decomposition of the carbon-containing raw material and synthesis of carbon nanotubes take place in a reaction tube placed in the heating furnace.

33. A carbon nanotube manufacturing method according to claim 19, wherein the carbon nanotube manufacturing apparatus of claim 1 is employed.

34. A gas decomposer for use in carbon nanotube manufacture in which a carbon-containing raw material carried on a gas flow is decomposed to synthesize a carbon nanotube from the decomposed carbon-containing raw material, comprising a porous material.

35. A gas decomposer according to claim 34, comprising a metal oxide material and a carbon material.

36. A gas decomposer for use in the carbon nanotube manufacturing method of claim 19.